

An Approach to Basin-Wide Impervious Area Measurement for Chinook Habitat Restoration

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CommEn Space

The restoration of naturally spawning Chinook populations in the Cedar/Sammamish watershed is a task complicated by the particularly unique features of this basin. The headwaters of the basin are within the protected bounds of the City of Seattle's water reservoir, while the Cedar's mainstem passes through the sub-urbanized lowlands of King County before it drains through urbanized Seattle and into Puget Sound. Spawning and rearing Chinook must pass through Lake Washington, which at 22,000 surface acres in size, constitutes an unusual and potentially challenging habitat for Chinook. To support a basin wide recovery plan for Chinook, an evaluation of current land cover was conducted focusing primarily on measuring the extent of impervious surface area in each sub-basin using GIS and remote sensing techniques. This technique known as spectral mixing analysis (SMA), is an image analysis process that supports repeatable and accurate extraction of sub-pixel information. SMA differs from standard image classification approaches by measuring the comprising percentages of two "end-members" pixel by pixel, rather than classifying groups of pixels with similar spectral signatures into a given land cover typology. Further, using a combination of automated and manual GIS operations, additional data was developed from digital aerial photographs to measure built shoreline structures on Lakes Washington, Sammamish and Union. These data have been combined with Salmon and Steelhead Habitat Inventory and Assessment Project (SSHAP) data resulting in greater resources to support basin wide restoration planning by the Muckleshoot Tribe.

CEE-TV: Contaminant Exposure and Effects-Terrestrial Vertebrates Database

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The "Contaminant Exposure and Effects--Terrestrial Vertebrates" (CEE-TV) database summarizes contaminant exposure and effects information for free-ranging amphibians, reptiles, birds, and mammals residing within approximately 30 km of Atlantic, Pacific and Gulf coasts and estuarine ecosystems, including Alaska and Hawaii. Information is obtained by solicitation of unpublished reports from conservation agencies, resource managers, and scientists and from computerized searches of published literature and review of existing databases. The database can easily be queried using taxonomic, chronological, geographic, and contaminant search categories. Potential applications of the CEE-TV database include focusing biomonitoring efforts to generate critically needed ecotoxicological data for identified "gaps" along the coast; reducing uncertainty about contaminant risk; identifying areas for mitigation, restoration, or special management; and ranking the ecological conditions of estuaries. The CEE-TV database for Atlantic and Gulf coast estuaries is presently available on the World Wide Web (<http://www.pwrc.usgs.gov/ceetv/>). This database contains approximately 6000 records with ecotoxicological exposure and effects information on over 150,000 individuals representing over 250 species of amphibians, reptiles, birds, and mammals residing in Atlantic and Gulf coast estuaries. We are currently working on the Pacific Coast CEE-TV database. A preliminary CEE-TV database for Washington State is presented.

A Spatial Database for Big Beef Creek, WA

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The purpose of this project was to establish a comprehensive spatial database for Big Beef Creek that would serve as a basis for future education and research activities at this site. Big Beef Creek, a salmon bearing stream, is located near Seabeck, Washington on Hood Canal. This small watershed encompasses about 38 square kilometers extending from the plateau of the Kitsap Peninsula through suburban development and forested land to productive tideflats on Hood Canal. University of Washington owns the lower 400 acres of the watershed and runs a fisheries field station at this site. The data compiled for this Geographic Information System (GIS) project includes Kitsap County vector coverages, a hydrological corrected Digital Elevation Model (DEM), and georegistration of multispectral imagery data at both 30 meter and one meter resolution. In addition to the raw data, this project also includes four useful project interfaces for examining the data, a lab journal to explain the methods used in creating the GIS archive, other supporting GIS metadata and a web interface to act as a user's guide in accessing the data. Spatial data is now readily available via the web and CD-ROM for use by students and researchers interested in using this field site. Sample data products will be presented.

Use of a Rotary Screwtrap to Monitor the Out-migration of Salmon Smolts from the Nooksack River: 1994 – 2000

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Lummi Nation

This project seeks to establish a measure of baseline smolt production levels for the Nooksack River Basin by enumerating the out-migrating of salmon using a rotary screwtrap in the lower river mainstem. Watershed improvements that benefit salmon should result in an overall increase in smolt production when compared with these baseline measurements.

A single 8-foot diameter EGS rotary screw smolt trap was located 7.6 km from the river mouth. Except in 1994, we sampled from April 1 until the end of July. Since 1996 we have operated the screwtrap every other day during the sampling season. Starting in 1997 we sampled a standardized 6-hour set with start times of 0000, 0600, 1200, or 1800 hours as determined by a randomized schedule.

Seven seasons of operation has demonstrated that out-migrants can be non-lethally captured by the screwtrap, enumerated, measured, and sampled for scales and DNA tissues. Trap calibration studies using chinook smolts developed an approach for developing abundance estimates for all salmon species enumerated. Stock identification using DNA tissue samples has been demonstrated for chinook salmon. We developed an index of abundance for chinook to evaluate future smolt production levels that are anticipated following watershed restoration efforts.

Salmon in the Dungeness: How a Newspaper Insert was Developed as a Watershed Education Tool

By Linda Newberry

Jamestown S'Klallam Tribe

The Jamestown S'Klallam Tribe has long been involved in watershed planning and restoration activities for salmon recovery in the Dungeness River watershed. Over the years, in addition to those activities, we have tried to continuously inform the public—our neighbors—about our work and that of others regarding salmon restoration efforts. Exciting educational projects have included a play written about “watershed characters,” an entry in the Sequim Irrigation Festival showing where the water comes from, as well as more traditional forms of educational outreach such as booklets, brochures and other written materials. Most of the efforts of Tribe and others involved in the Dungeness watershed restoration activities have been well received by the community.

But because of ongoing attacks and misinformation published in the local press and expressed at public meetings by some members of the community, in 1999 the Jamestown S'Klallam Tribe sought and received an EPA Environmental Justice Grant that partially funded an effort to try to provide accurate information to the general public about salmon and the Tribe's role in fisheries management. As the project developed, listings occurred of Dungeness and other Puget Sound chinook and summer chum under the Endangered Species Act.

In 1999-2000 the Tribe developed a two-part newspaper insert focusing on salmon in the Dungeness watershed. An editorial committee (Tribal Council member, natural resource dept. staff, and public information specialist) shaped the content to meet rising interests in salmon/ESA issues. A wealth of historical/technical information collected over 10 years was extensively used to provide information for public interest. Northwest author and poet Tim McNulty was hired to prepare the text. The Tribe's natural resources staff completed the research and provided the editing, graphics and layout.

The self-contained inserts were published in September 2000 in both the Sequim Gazette and Port Townsend Leader. The impacts of the insert have been discussed at the Dungeness River Management Team, and an evaluation form was circulated. Overall, the comments returned were extremely positive. They illustrated the public's concern for salmon recovery, as well as expressed their interest in receiving complex information, presented in an interesting format. An additional 2000 copies are being distributed upon request to teachers, fish and wildlife managers, local governments and other interested parties.

Preparation of the insert was educational to staff as we synthesized complex technical information for public dissemination. Additional benefits of the project were that we built upon our information base, as well as a good relationship between the Tribe and the local newspaper. Even some of the newspaper staff asked questions, and were excited about learning the information in the articles.

Finally, the project emphasized the importance of conveying a sense of place for local residents in their home watershed, making regional natural resource issues more relevant.

For more information contact the Jamestown S'Klallam Tribe, (360) 681-4601, or lnewberry@jamestowntribe.org.

Analysis of Atmospheric Source Contaminants in Biota of the North Shore Forested Watersheds of the Lower Mainland: A Pilot Study

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The impact of atmospheric metals and PAH contaminants on the watersheds of the Lower Mainland, British Columbia, was investigated using a biomonitoring approach. The moss *Isoetes stoloniferum* was sampled at 9 forested locations and Perlidae and Pteronarcyidae stoneflies were sampled in 5 creeks on a west-east transect along the north side of the Lower Fraser Valley in March 2000. Selected metals and low molecular weight PAHs were significantly higher in moss samples from western sites. High molecular weight PAHs tended to be more concentrated in eastern areas. Stonefly data followed a similar but less significant trend. Moss samples from the Lower Fraser Valley were previously analyzed in 1993 for metals; these samples were collected in 1960-65, 1975-80, and 1993. Moss samples taken in March 2000 contained higher levels of manganese, chromium, nickel, zinc, and cadmium than in the previous investigations. Lead, in contrast, has further declined. Metals and selected PAH levels in the Fraser Valley were lower than in industrialized Europe but well above background. It is desirable to continue biomonitoring with a higher number of sites in the Lower Fraser Valley and possibly extend into the airshed south of the border to obtain a complete atmospheric deposition and impact pattern.

Small Streams Toxicity/Pesticide Study

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Recent pesticide monitoring has shown the presence of a number of currently-used pesticides in small urban streams in King County, Washington. . A follow-up study was conducted in 1999 to assess toxicity and chemical concentrations of pesticides and metals in three of the small urban streams previously evaluated. Toxicity to the test species *Selenastrum capricornutum* was observed in the three test streams during three sampling events: spring and fall runoff and summer baseflow. Toxicity to *Ceriodaphnia dubia* was not observed at any time during the study. A total of 21 pesticides were detected out of 168 that were tested for, and 6 metals out of 13 that were tested for. Toxicity tests with each test species were conducted with both filtered and unfiltered samples. Toxicity to *S. capricornutum* observed in the unfiltered samples was significantly reduced in the filtered samples. Based on these data , it appears much of the observed toxicity was caused by exposure to particulate associated chemicals.